AVERAGE MEASUREMENTS OF *Ardea virescens anthonyi.*

Number of Specimens, Sex, and Age.	*Locality.*	*Length.*	*Alar Expanse.*	*Wing*	*Tail.*	*Culmen from Feathers.*	*Tarsus.*	*Middle Toe and Claw.*
6 Adult males.	Salton and New Rivers, Colorado Desert.	498	746	207	78	62	56	58
1 Adult male.	San Pedro River, Mexican boundary line.	505	760	210	85	60	55	58
9 Adult males.	Verde River, central Arizona.	497	730	203	77	60	54	59
4 Adult females.	Salton and New Rivers, Colorado Desert.	488	735	203	79	61	54	55
4 Adult females.	Verde River, central Arizona.	490	735	200	76	61	54	58
16 Adult males.	Southwestern border of the United States.	498	738	205	77	61	54	58
8 Adult females.	" " " "	489	735	202	78	61	54	56

Ardea virescens.

1 Adult male.	Fort Snelling, Minnesota.	480	705	197	75	64	54	56
5 (Adult?) females.	Highlands of the Hudson River, New York.	451	679	183	76	58	51	—

HAWK FLIGHTS IN CONNECTICUT.[1]

BY C. C. TROWBRIDGE, COLUMBIA COLLEGE.

DOUBTLESS many naturalists and collectors have observed large flights of different species of birds, from time to time, along the eastern coast of the United States, and they have probably noted also that certain birds were sometimes common and even abundant in flights, while at all other periods they were very rarely seen in that part of the country, where they had suddenly become so plentiful.

Although the reasons for the appearance of unusual numbers of birds, in some localities, at one time, have not always been understood, causes of the occasional abundance of some of the

[1] Read before the New York Academy of Sciences, May 13, 1895.

water birds have been, for a long time, considered known. Such is the case of the flights of the Golden Plover (*Charadrius dominicus*) and the Eskimo Curlew (*Numenius borealis*), species which are sometimes very common, during their southward journey, on the capes and islands of our eastern coast. The blowing in shore of the birds, in their line of flight, by easterly winds when, in August, they are migrating south far out at sea, has been generally accepted as the cause of the sudden appearance of numbers of these two species of the Limicolæ, every few years, flying over the island of Nantucket, Cape Cod, and other such out-lying portions of our country as are washed by the Atlantic Ocean.

Land birds have also occasionally appeared in flights in great numbers, and it has been my pleasure to have devoted some time to observing the unusual gatherings and flights of the Falconidæ.

Some years ago, my attention was called to certain peculiar actions manifested by the Hawks, during their migrations through the New England States, and more particularly to great flights of these birds, which often occurred in southern Connecticut in the months of September and October, when most of these Raptores pass that State on their way to the South in quest of warmth and sunshine and a hunting ground, where food is more easily procured, than in the bleak north, during the winter season.

In the course of a number of years, while collecting ornithological specimens in the vicinity of New Haven, Connecticut, I observed that on certain days early in the fall, almost annually, immense flocks of hawks appeared migrating southward, and I also noticed that several of the hawks, which were very abundant during these flights, were of a species rarely found in Connecticut at other times of the year.

The hawks sometimes appeared in such great numbers, and so suddenly and so irregularly, that I felt sure that there must have been some underlying causes which influenced the fall migration of these birds, and thus were gathered together into flocks a family of birds, the species of which even, under usual conditions, are seldom observed otherwise than alone or in pairs.

I therefore determined to investigate the question and to search for possible causes, which might have affected the migra-

tions and produced these flights, and with the material from the observations which I made, I hoped to partly — if not wholly — solve the question concerning the causes of the flocking of hawks in Connecticut during the autumn migrations.

Always during the last few days of August, and even later, before the brisk fall winds commenced to blow, a few stragglers of the Accipiters and Buteos would be seen soaring southward in Connecticut, some drifting with the wind far above in the clouds, while others were sailing low down over the fields.

But in the middle of September, when the stronger winds blew from the northwest and north, and the temperature lowered, the number of hawks which were passing greatly increased. Sometimes, however, when there was little or no wind, and the day was warm and dull, or if the prevailing winds had been southerly for several days, very few hawks were observed. But suddenly, when a fair breeze had sprung up from the northwest, the sky above the land near the sea-coast became almost clouded with hawks of various species, active and restless, circling and soaring about.

Flights in which there were many hundreds of birds I have seen many times, and I have on certain occasions counted several hundred hawks soaring together in one flock, looking like an immense swarm of gigantic insects. Often on a day after a flight, the wind having turned again to the south, many species of hawks were found in the woods and about ledges of cliffs, some perching on old trees, others lazily feeding, while a few were seen soaring about in a sluggish manner, showing the presence of an unusual number of hawks, although few of them appeared to be migrating.

On the wooded hills near Long Island Sound, during a flight, the hawks were found flying through the trees, but as they passed on and flew towards any very populated district, they arose high above in the clouds, so that most of these birds must have passed unseen except by those observers who were on the lookout for them.

On several occasions, before I had had the pleasure of being actually in the midst of a hawk flight, I had observed large flocks of hawks circling very high in the sky, and Dr. C. Hart Merriam,

in his 'Birds of Connecticut,' mentions a congregation of hawks as follows: "On the 25th of September, 1875, I saw near New Haven, a flock of twenty-six Red-tailed Hawks, soaring high and sailing slowly southward. The day was clear and cool, and there was little wind."

The first very large flight of hawks which I ever witnessed occurred on the 18th of September, 1886, and on that day there was also a great flight of Red-headed Woodpeckers (*Melanerpes erythrocephalus*) and Flickers (*Colaptes auratus*).

I started from New Haven early in the morning and arrived upon the field of observation before sunrise. The hawks appeared at about seven o'clock, and the flight continued during the rest of the morning. All the Raptores passed westward along the coast-line of Connecticut. At one moment they flew high above the fields, and at the next low over the crests of the hills, some nearly grazing the open ground, while others darted through the tree tops of the more wooded portions of the high lands. Several species of hawks were very abundant, especially the Sharp-shinned (*Accipiter velox*), in the young plumage. On the 16th of September of the following year (1887), there occurred another great flight of hawks, and I was again fortunate enough to witness it. There was little wind at first, and the hawks did not appear until nine o'clock in the morning, when a few Sharp-shinned Hawks were observed. But later on in the day, the wind increased in force. Thousands of hawks of different species flew past New Haven, and Broad-winged Hawks (*Buteo latissimus*), both adults and young, appeared soaring in immense clusters. In one great flock alone there must have been three hundred hawks, the greater part of which were undoubtedly *Buteo latissimus*, although with field glasses I distinguished several species in the flock. I also observed several Bald Eagles (*Haliœetus leucocephalus*) in various plumages, circling high. The flight continued from nine o'clock in the morning until darkness set in in the evening. The day was cool and fine and the wind blew very briskly from the north. On the next day there was a flight for a short time early in the morning, but the direction of the wind changed and the flight ceased soon after.

One week later, on the 24th of September, after a number of days of southerly winds, there occurred a flight which lasted from

six o'clock in the morning until noon. I was informed by several collectors, who were out shooting at the time, that three flocks of Broad-winged Hawks passed over them, and that they were able to secure a number of the birds. I examined several and found that the adult specimens were moulting about the head.

No very large flight of hawks occurred in the fall of 1888, but in 1889 on the 28th of September there was another great flight, but, unfortunately, I did not see it, for on that day I was in Hartford, Connecticut, where no flight occurred. Although I have been in the northern part of the State of Connecticut repeatedly in the autumn, I have never seen more than a few hawks at one time in that section, and those were generally flying southward, on a day when the wind blew from the north.

Mr. Willard G. Van Name of New Haven has informed me that the flight which took place on September 28 was made up of almost all the species of hawks which are migrants in New England, and many other different land birds, and also that the hawks all flew in a westerly direction over the city of New Haven.

On the days on which the above flights occurred, the conditions of the weather were quite the same. In each case it was clear and cool, with a strong northwest wind.

On the 18th of September, 1890, when a large flight of hawks occurred, the day was warm and partly cloudy, but there was a light breeze from the northwest, and there had been southerly winds for a long period previous, which seemed to show that the south winds had temporarily checked the migration of the hawks. During this flight, the hawks flew higher than usual, but I observed two immense flocks of Broad-winged Hawks (*Buteo latissimus*), and I saw several of them shot down, together with Sparrow Hawks (*Falco sparverius*), Sharp-shinned Hawks (*Accipiter velox*), and Cooper's Hawks (*Accipiter cooperi*), all of which were plentiful.

In the fall of 1891, I was very anxious to obtain a number of specimens of different species of the Falconidæ, and I went out from New Haven repeatedly with hopes of finding a flight in progress, but I could only find the hawks flying on three days, the 8th, 9th, and 14th of September. The first two days I secured but a few, but on the 14th I killed over twenty, the greater part

LIST OF 'HAWK FLIGHTS' WHICH HAVE OCCURRED IN SOUTHERN CONNECTICUT DURING THE YEARS 1885–1894.

Date.	*Weather.*	*Wind.*	*Veloc. of the Wind.*	*Remarks.*
Sept. 23, '85	Wet and cloudy	N.	Moderately strong[1]	Moderate flight; *Falco sparverius* common.
Sept. 18, '86	Clear and cool	N. W.	Very strong	A great flight of small hawks and various other land birds.
Sept. 22, '86	Clear	N. W.	Light	*Buteo latissimus* abundant.
Sept. 16, '87	Clear and cool	N. W.	Very strong	A great flight all day.
Sept. 17, '87	"	N.	Light	*Buteo latissimus*, abundant early in the morning.
Sept. 24, '87	"	N. W. to N.	Strong	" " also *Accipiter velox*.
Oct. 19, '87	"	N.	———	No large flight, but almost all the migrant hawks observed.
Sept. 10, '88	———	N.	Light	*Accipiter velox* abundant.
Sept. 22, '88	Clear and cool	N. W.	Mod. strong	Moderate flight.
Sept. 22, '89	"	N. W.	" "	" "
Sept. 28, '89	"	N. W.	Strong	Very large flight.
Oct. 15, '89	Cool	N. E.	———	Moderate flight; *Accipiter velox* plentiful as usual.
Sept. 18, '90	Fair and warm	N. W.	Light	Forty hawks killed; *Buteo latissimus* abundant.
Sept. 21, '90	Fair	N. W.	Mod. strong	Moderate flight.
Sept. 23, '90	"	N. W.	" "	*Pandion haliaëtus carolinensis* abundant.
Sept. 24, '90	"	N. W.	" "	Small flight.
Sept. 8, '91	"	S. W.	Light	Small flight of *Accipiter velox*.
Sept. 9, '91	"	W.	Mod. strong	Hawks increasing in numbers.
Sept. 14, '91	Clear and cool	N. W.	Strong	A large flight; killed over twenty hawks.
Oct. 21, '92	Clear	N. W.	Strong	Small flight. Comparatively few passed this year.
Sept. 20, '93	Clear and warm	N. W.	Mod. strong	Large flight; *B. latissimus* abundant; *Falco columbarius* killed.
Sept. 21, '93	Clear and cool	N. N. W.	Very strong	Great flights of adult *Buteo latissimus*.
——— '94	(No flight)			No large flights occurred this year.

[1] In the above list a 'strong' wind indicates a velocity of from 25 to 40 miles per hour, a 'moderately strong' wind from 10 to 25 miles per hour, and a 'light' wind from 5 to 10 miles per hour.

of which were Sharp-shinned (*Accipiter velox*). On this day I saw no less than twelve Bald Eagles (*Haliæetus leucocephalus*) in various plumages flying over New Haven, soaring slowly towards the southwest.

Again, during the autumn of 1893, I made careful observations, but found few hawks passing until the 20th of September, when quite a flight occurred. This time I obtained two Broad-winged Hawks, a Sparrow Hawk, and a Pigeon Hawk (*Falco columbarius*), and although I could have shot many young Sharp-shinned Hawks, which were very abundant, I refrained from doing so. Early on the following day, the 21st, there appeared a flock of about twenty-five Broad-winged Hawks circling low over the city of New Haven. I hastened out with my gun and soon stood in a position favorable for observation, where I saw hundreds of them, and secured eight beautiful adults with the greatest case. I even took a selection of plumage, as the birds passed a few yards overhead, battling against the strong wind which blew from the northwest, as they flew along the coast.

Last year (1894), I was unable to take observations, but I have made inquiries, and have been told that no large flight occurred.

The following is a list of the Falconidæ found in Connecticut and the frequency of the appearance of the various species in the autumn 'flights' in the southern part of the State.

Circus hudsonius. MARSH HAWK. — Common summer resident. Breeds, abundant in 'flights.'

Accipiter velox. SHARP-SHINNED HAWK.— Summer resident. Breeds sparingly late in May. Exceedingly abundant in September.

Accipiter cooperi. COOPER'S HAWK.— Occasionally seen in winter. A common breeder, and fairly abundant in 'flights.'

Accipiter atricapillus. AMERICAN GOSHAWK.— Rare migrant late in the fall.

Buteo borealis. RED-TAILED HAWK.— Common resident. Seldom breeds near the sea coast. Small flocks are often seen about October 1.

Buteo lineatus. RED-SHOULDERED HAWK.— Resident. Breeds abundantly, but is never common in 'flights.'

Buteo latissimus. BROAD-WINGED HAWK.— Summer resident, but breeds sparingly. Very regularly abundant in 'flights' from the middle to the last of September. Thousands pass nearly every fall. This species is common in northern New England, and parts of Canada during the summer.

Archibuteo lagopus sancti-johannis. AMERICAN ROUGH-LEGGED HAWK. Not very rare in the cold season on the low marsh lands.

Haliæetus leucocephalus. BALD EAGLE.— Resident. A few pairs breed within the State. Common in September in 'flights.'

Falco peregrinus anatum. DUCK HAWK.— Rare resident. On May 9, 1888, a nest with three fresh eggs was found on a cliff, twelve miles from New Haven, Conn. Occasionally shot in the fall.

Falco columbarius. PIGEON HAWK.— Resident, but rare at all times, except in September. No record of its nesting within the State has yet been established.

Falco sparverius. AMERICAN SPARROW HAWK.— Resident; but does not breed very abundantly. Very common in 'flights,' when two, three, or four are generally found migrating together.

Pandion haliaëtus carolinensis. OSPREY.— Common summer resident. Very abundant during September.

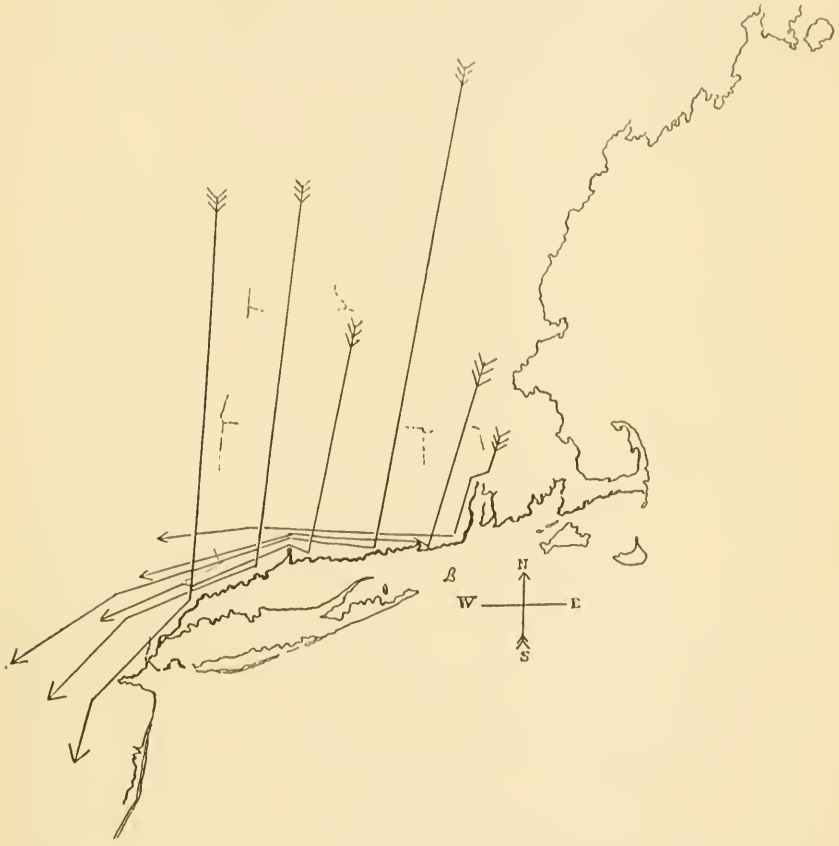
In the spring for a number of years, I used to be constantly in the field in southern Conneticut, and yet I have never noticed any gathering of hawks, nor have I ever found them at all numerous at any time during that season. And those which were seen during the spring were, for the most part, birds which were nesting in that locality.

As is well known, hawks are not usually gregarious in their habits, and yet at various times they have appeared in immense flocks, and have been found to be migrating together in vast numbers, as in the flights which have been observed along the Connecticut coast, on certain days in the fall.

Taking into consideration the conditions which existed during the time of all the hawk flights, such as the strong northerly winds and the cool and clear state of the weather, and also keeping in mind the outline of the southern portion of the New England coast, the correct solution of the origin of these flights can perhaps be obtained by finding causes in these conditions.

It is my belief that the manner in which the flights of hawks occurred was as follows. All the southern border of Connecticut is washed by Long Island Sound, and the entire shore lies nearly in an east and west direction. When the migrating hawks flew southward with the strong northerly winds, and arrived at the Sound, rather than fly over the water, they would turn westward and proceed along the coast until they arrived at the State of New York, where they would continue southward, through New Jersey

and Pennsylvania. Thus, during their flight, they were crowded together along the entire southern border of Connecticut, as will be seen by an inspection of Map I.

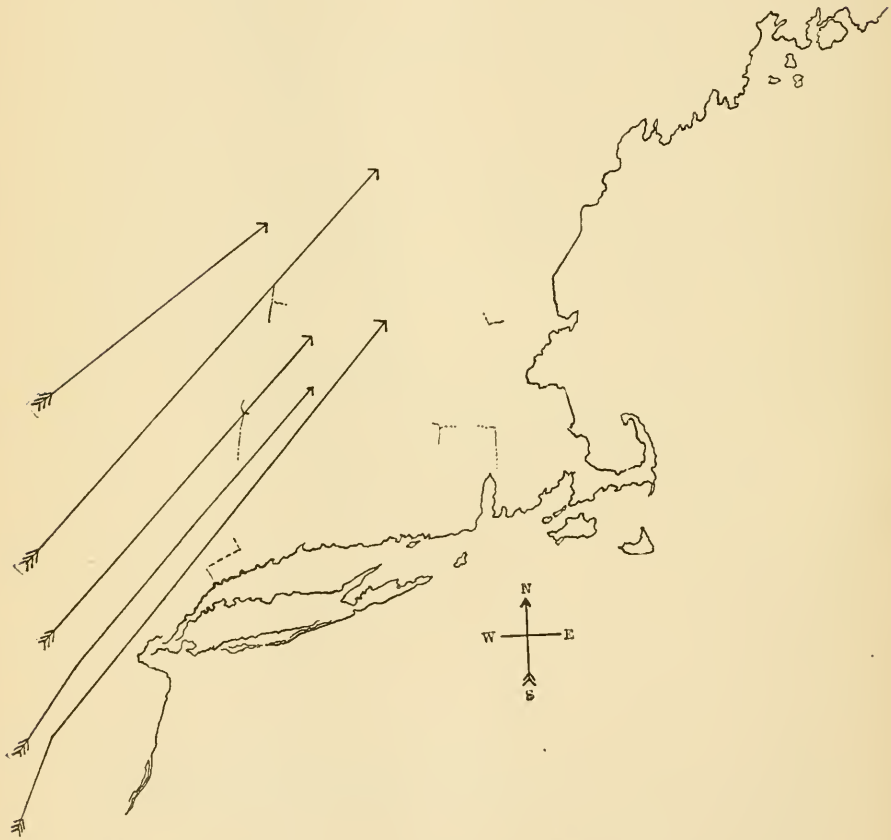


MAP I. COAST-LINE OF THE NEW ENGLAND STATES.—The arrows indicate the general direction of flight taken by Hawks during the autumn migrations, when the winds are N. W.; showing how the Hawks congregate at the coast-line.

The hawks seemed to invariably wait before flying south, until a wind blew which would favor them in their migrations. And I have noticed that the greatest flights have occurred when the wind

had suddenly changed to a northerly direction, after a period of prevailing southerly breezes, showing that the adverse winds had held back the hawks and delayed their southward journey.

An examination of the weather maps of the U. S. Weather Bureau has showed that on the days when the greatest flights occurred, the wind was northerly throughout New England, and also that previous to these flights the wind had generally been southerly for several days.



MAP II. COAST-LINE OF THE NEW ENGLAND STATES.— The arrows indicate the general direction of flight taken by the Hawks in the spring, when the winds are S. W.; and show why the migrating Hawks do not pass through the southern New England States at that season in any numbers.

The hawks migrating from eastern Canada and all the New England States are those which find their course turned by the southern coast line of Massachusetts, Rhode Island, and Connecticut, and although many hawks may fly over the water to Long Island, yet I am quite confident, from all my observations, that the great majority of them do not attempt it, but that they pass westward along the coast through Connecticut, whenever they fly from the north with a strong free wind, and find themselves at Long Island Sound.

The above theory, accounting for these hawk flights, applies equally to flights of other land birds which occur occasionally, and the abundance of various species, on the southern border of the three above-named New England States, in the fall of the year, for often there occurs during the autumn months a large flight of land birds, which is always greatest near the coast.

Perhaps the peculiarities of the 'flights' of birds in various parts of the world could be traced to causes similar to those which seem to affect the migration of birds in New England; for the position and direction of coast lines, and even mountain ranges, and the direction of the wind, are certainly very important factors in the migration of wild fowl. Thus it seems as if in the case of the flights in southern New England, that the east and west direction of the coast line, and the wind, both have their effect in influencing the migration of the hawks and other land birds.

There have always been flights of some size of the diurnal Raptores during the fall of every year, except when the prevailing winds have been east. In that case the greater portion of the migrating hawks seem to have been blown and to have flown to the westward. And as a southwest line of flight from most of the New England States does not cross Connecticut, most of the hawks must have gone south without passing over that State.

Somewhat similar conditions must have existed during the spring migrations: when a southwest wind prevailed, and the hawks were flying northward, they took advantage of it, and, in general, sailed northeastwardly, and so have not passed over the southern New England States in any great numbers, for these States did not lie in the line of their flight, which accounts for the observed scarcity of these migrating Raptores in the spring.

The above theories relating to the causes of flights of hawks and of other land birds also, seem to be absolutely substantiated by all data which I have been able to procure, and although I found that the evidences were always in favor of the foregoing explanation of the flight of hawks in Connecticut, I wished to make observations over a number of years, in consequence of which I am able to present a complete list of the flights which have occurred at intervals during the last decade,—1885 to 1895.

NOTES ON THE ANCIENT MURRELET (*SYNTHLIBORAMPHUS ANTIQUUS*), BY CHASE LITTLEJOHN. WITH ANNOTATIONS.

BY MAJOR CHARLES BENDIRE.

AMONG our North American Waterbirds, there are few whose general habits, etc., are less known to ornithologists than the Murrelets representing the genera *Synthliboramphus* and *Brachyramphus* Brandt; and in fact we know scarcely anything about the majority of the species belonging to them.

The best known of these is the Ancient Murrelet, also sometimes called Black-throated Guillemot and *Starik* (Old Man) by the Russians. Its geographical range extends along both the coasts and islands of the North Pacific from Japan and the Kurils, north to Kamchatka, Asia and across the Alaska Peninsula, south to Puget Sound, Washington, and perhaps still farther in this direction in winter.

Mr. Chase Littlejohn of Redwood City, California, who spent the spring and summer of 1894 on different islands of the Alaska Peninsula, engaged in making natural history collections, has kindly furnished me with the following notes on this still little known species, which I deem of sufficient interest and importance to publish at once, particularly as it may draw the attention of collectors to some of the other species found along the coasts of the Pacific Ocean, which are still less known and whose general habits are probably very similar.

All of our Murrelets spend the greater part of the year, as far as known, on the ocean, and mostly out of sight of land, only